species recorded by Prof. Jones include several Ostracoda, but none of them appear to belong to the *Cytheridea* referred to here. Moreover, the shell-bed in which this Ostracod occurs is apparently referable to a later date than the deposit in which the Bahia fossils were obtained that are described by Prof. Jones.

The *Azara* is said to be still living in the estuary of the Plata, and probably the *Cytheridea* may also be still living there; for if the same conditions that were suitable to the existence of the *Azara* when the bed in which they are now found fossil was being formed were also congenial to the *Cytheridea*, it is reasonable to suppose that the conditions under which the mollusk is living now will also be favourable to the existence of the Ostracod.

The figures on the annexed Plate XVI. represent (1) a sketch (fig. 1), drawn from memory by Mr. John Scott, of two of the dunes, to indicate approximately the position of the shell-beds in which the fossils occur, and (2) two drawings (figs. 2 and 3) by Mr. A. Scott, showing a lateral and a dorsal view of the Ostracod, prepared from Buenos Ayres specimens.

LXI.—*Embryology of* Ophiocoma echinata, *Agassiz*. (Preliminary Note.) By C. Grave*.

The conflicting results of previous investigators, and the need of confirmation of some of the results obtained by them upon Ophiurid development, seemed to warrant my undertaking a new investigation of the subject; and by the advice of Prof. W. K. Brooks it was made my principal object while in Jamaica during the summer of 1897 to obtain a series of embryological material extending at least from the segmentation stages to the beginning of metamorphosis.

But when I arrived at Port Antonio on June 14th I found that in no species at hand had the breeding-season begun except with *Ophiocoma Riisei*, with which it was over, and it was not until less than three weeks of the end of my stay that the first ripe eggs were thrown by *Ophiocoma echinata*, although ripe spermatozoa had been obtained every day for more than a month.

In consequence of this the oldest plutei reared were but

* From the 'Johns Hopkins University Circulars,' November 1898, pp. 6–7.

sixteen days old and showed no signs of metamorphosis, but probably had reached their adult form and size.

The eggs, which were of an orange-red colour, after being fertilized, threw about themselves a tough prickly egg-membrane, which rendered preservation difficult until it was burst and the larva had escaped.

At first the points and ridges of this chitinous egg-membrane were quite high and regular, but soon were worn down and became as shown in figure 1. Under the outer egg-membrane is still another, very thin and closely applied to the developing larva.

Segmentation was regular, and a blastula was formed, consisting of cells of equal size or nearly so, and with a very small segmentation-cavity. The long cylindrical cells composing its walls before dividing flatten down and become as nearly spherical as conditions will admit, as has been described by Korschelt for sea-urchins and as is shown for *O. echinata* in figure 1, which is a camera sketch of a section

Fig. 1.

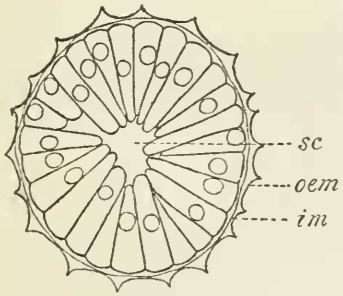
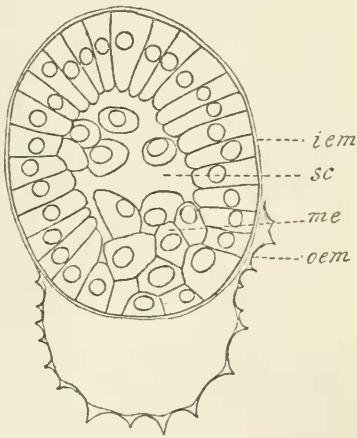


Fig. 2.



of a blastula. The growing larva now bursts the chitinous membrane which encloses it, crawls out, and swims about in the water. It is somewhat elongated and swims in the direction of the axis connecting the animal and vegetable poles, the animal pole, which is slightly pointed, preceding.

As it moves from place to place it is continually revolving on the long axis. At the time of hatching the mesenchyme formation has just begun. It takes place by the rapid proliferation of cells at the vegetable pole, no evidence being

found of its originating as two bands, and is continued until the segmentation-cavity is quite crowded with cells. Figure 2 is a camera sketch of a section of a larva at the time of hatching, cutting it in the plane of the long axis, showing the shape of the larva at this stage and the method of mesenchyme formation.

The cilia did not show in the section, but those at the animal pole are much longer than those over the rest of the larva.

The gastrula-stage is formed several hours later by the invagination of the vegetable pole. The cells composing the invaginated tube or archenteron are all of about the same shape and size, but a decided differentiation is to be noted among the ectoderm cells. Those at the animal pole are much elongated and vacuolated, thus forming a thickened apical plate. The lateral walls, too, have each a thickened area, while the cells of the ventral side are of a uniform thickness, but much thicker than those composing the dorsal surface of the larva, which are much flattened and thin. Near the thickened lateral areas clumps of mesenchyme cells collect and begin to secrete the larval skeleton. Beside these, other mesenchyme cells take up the function probably of support for the archenteron and other organs as they form. At least in gastrulæ and older larvæ long branching cells can be seen in the segmentation-cavity connecting the archenteron with the ectoderm wall or with other mesenchyme cells, or connecting two portions of the ectoderm. The cells of the supported parts to which the processes of the mesenchyme cells attach take an active part in the formation of the connecting fibre or strand, as part of their substance meets and fuses with that sent out by the mesenchyme cell.

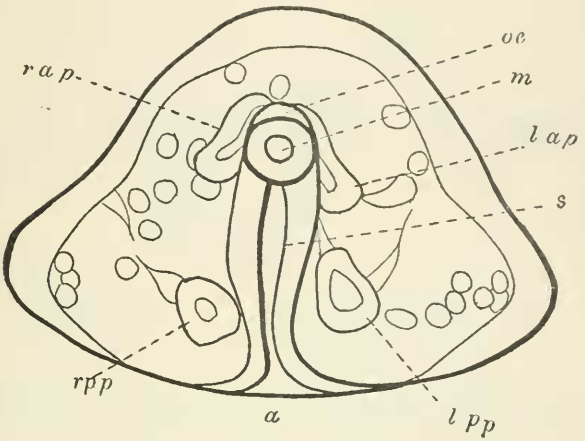
From the apex of the flattened archenteron a pair of pouches grow out and are constricted off, one to the right, the other to the left. Each of these divides into two pouches of about equal size, one of which remains in about its original position, while the other migrates toward the blastophore and takes up a position on the side of that part of the archenteron which will later become the stomach. This is as Metschnikoff described it and as Bury supposed must be the case; but, contrary to what both the above investigators describe, I find that the right posterior pouch degenerates and disappears, thus leaving a larva with a pouch on either side of the œsophagus and one on the left side of the stomach. This condition was noted in every pluteus observed, and hundreds of them have been studied.

In confirmation of the phenomenon observed in Ophiurans

by Metschnikoff and in starfish larvæ by Brooks and Field, I find that soon after their formation the two anterior pouches both communicate with the exterior through pore-canals which open on the dorsal surface of the larva.

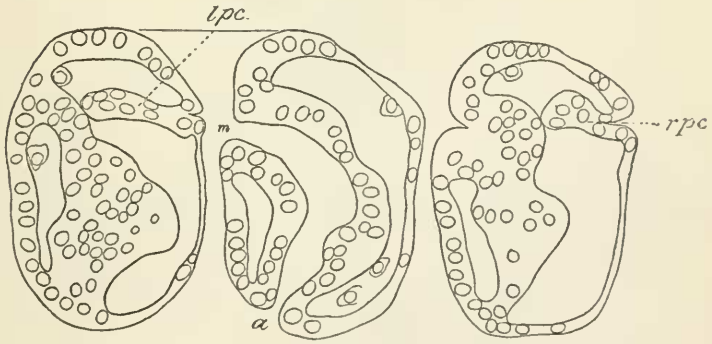
At about the time of the formation of the pore-canals or a

Fig. 3.



little before, the larval mouth breaks through on the ventral surface and there is formed the perfect bilaterally symmetrical larva shown in fig. 3, which is the optical section of a larva

Fig. 4.

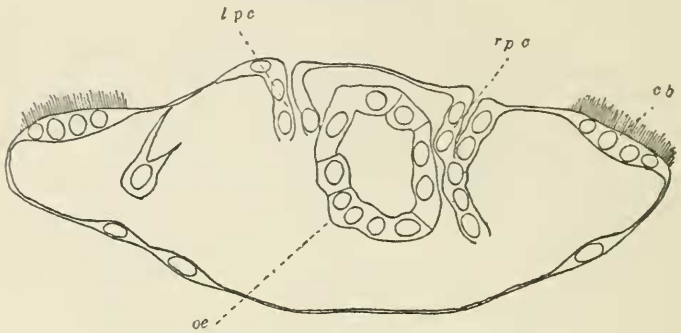


lying on its dorsal surface, the outlines having been made with a camera lucida.

The pore-canals are not, as Bury describes, intracellular

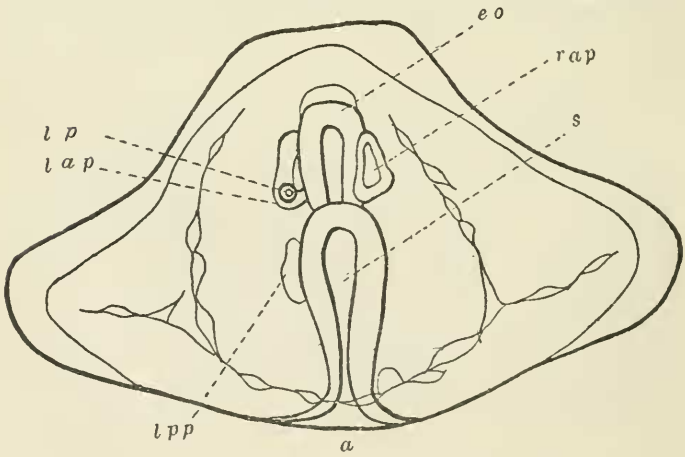
structures, but consist in an epithelium of flattened cells, as is shown by figs. 4 and 5, which are camera drawings of sections of two larvæ. Fig. 4 represents the seventeenth, twenty-first, and twenty-fourth longitudinal sections of a young larva, the seventeenth section passing through the edge of the alimentary canal and left pore-canal, the twenty-first

Fig. 5.



being the median sagittal section and passing through the mouth and anus, the twenty-fourth cutting the larva in the plane of the right pore-canal. Fig. 5 is a transverse section

Fig. 6.



through the œsophagus of a slightly older larva cutting both pore-canal openings.

The abundance of apparently normal larvæ having two pore-canals indicates that it is a normal condition of larvæ of that stage, which, should it so prove to be, would probably constitute a character of some phylogenetic importance. The right pore-canal sooner or later disappears, but persists slightly longer than the right posterior pouch, which is very transient in its character.

With the exception of the arms, which become very long, and the skeleton, which has been dissolved out, the pluteus, after undergoing the above transformation, appears as shown in fig. 6, which is the optical section of a young pluteus made in the same manner as fig. 3, but in this case the pluteus is lying on its ventral surface.

Explanation of letters in Figures.

a. Anus.
cb. Ciliated band.
iem. Inner egg-membrane.
lap. Left anterior pouch.
lpc. Left pore-canal.
lpp. Left posterior pouch.
m. Mouth.
me. Mesenchyme.
oe. Œsophagus.
oem. Outer egg-membrane.
rap. Right anterior pouch.
rpp. Right posterior pouch.
rpc. Right pore-canal.
s. Stomach.
sc. Segmentation-cavity.

LXII.—*Some apparently undescribed Insects from the Transvaal.* By W. L. Distant.

COLEOPTERA.

Longicornia.

Fam. **Cerambycidæ.**

Merionœda africana, sp. n.

Black; anterior and intermediate legs, basal non-dilated portion of posterior femora, and the elytra (excluding apical angles) ochraceous. Palpi, mandibles, and maxillæ brownish ochraceous.

The antennæ are somewhat obscurely pubescent and inwardly pilose. Head large, subquadrate, about as long as broad, coarsely punctate. Pronotum about half as long again as the head, sparingly but coarsely punctate, with a central longitudinal linear incision and a large discal foveate impression, its lateral margins slightly convex and pilose. Scutellum dull opaque black. Elytra sparingly but coarsely